CLAIMS

I claim:

1. A method for forming metal items, the method comprising:

(a) suspending a rotatable roller above a support surface;

(b) positioning a supply of metal adjacent the support surface; and

(c) creating a layer of the item by melting a portion of the metal with a directional heat source onto the support surface while rolling the roller over a plasticized portion of the molten metal in a continuous process, a distance between the roller and the support surface defining a thickness of the layer of the item.

2. The method of claim 1, further comprising:

(e) repeating step (c) to create a vertical stack of layers, each layer being applied adjacent a previous layer.

3. The method of claim 1, wherein:

step (c) comprises creating the layer with a constant thickness.

4. The method of claim 1, wherein:

step (c) comprises using an electron beam as the heat source.

5. The method of claim 1, wherein:

step (c) comprises using a laser as the heat source.

6. The method of claim 1, wherein:

step (b) comprises using aluminum as the metal.

7. The method of claim 1, wherein:

step (b) comprises using titanium as the metal.

8. The method of claim 1, wherein:

step (a) comprises suspending the roller from a gantry, the gantry being used to position and move the roller in relation to the support surface.

9. The method of claim 1, wherein:

step (b) comprises using a wire as the supply of metal.

10. The method of claim 1, wherein:

step (b) comprises using powdered metal as the supply of metal.

11. The method of claim 1, wherein:

the gantry is adapted to be controlled by a computer; and

the computer moves the gantry in correlation to a computer representation of the item.

12. The method of claim 1, wherein:

the gantry is adapted to be controlled by a computer; and

the computer moves the gantry in correlation to a computer representation of the item, each layer being formed to be a physical representation of a horizontal slice of selected thickness within the computer representation of the item.

13. A method for forming metal items, the method comprising:

(a) suspending a roller above a support surface;

(b) feeding a wire of metal onto the support surface forward of the roller;

(c) melting an end of the wire to create a molten puddle; and

(d) moving the wire and roller simultaneously along the support surface to create a layer, with the roller rolling on the puddle as the puddle cools.

14. The method of claim 13, further comprising:

(e) repeating step (d) to create a vertical stack of layers, each layer being applied adjacent a previous layer.

15. The method of claim 13, wherein:

step (c) comprises using an electron beam to melt the wire in a vacuum.

16. The method of claim 13, wherein:

step (c) comprises using a laser to melt the wire in an inert atmosphere.

17. The method of claim 13, wherein:

a computer controls the movement of the wire and roller in correlation to a computer representation of the item, each layer being formed to be a physical representation of a horizontal slice of selected thickness within the computer representation of the item.

18. An apparatus for forming metal items, the apparatus comprising:

a gantry adapted to be mounted above a support surface and capable of moving in at least three axes;

a feeding mechanism for feeding a rod of supply metal onto the support surface, the feeding mechanism being mounted to the gantry for movement therewith;

a directional heat source mounted to the gantry for movement therewith, the heat source being used to melt a lower end of the rod as the gantry travels, creating a molten puddle on the support surface;

a rotatable roller suspended from the gantry above the support surface for rolling over the molten puddle as it cools, creating a desired height in the metal being deposited.

19. The apparatus of claim 18, wherein:

the heat source is an electron beam.

20. The apparatus of claim 18, wherein:

the heat source is a laser beam.

21. The apparatus of claim 18, wherein:

the gantry is adapted to be controlled by a computer; and

the computer moves the gantry in correlation to a computer representation of the item, each layer being formed to be a physical representation of a horizontal slice of selected thickness within the computer representation of the item.